VIBRATORY PARTS FEEDER
USER MANUAL
EURO SERIES

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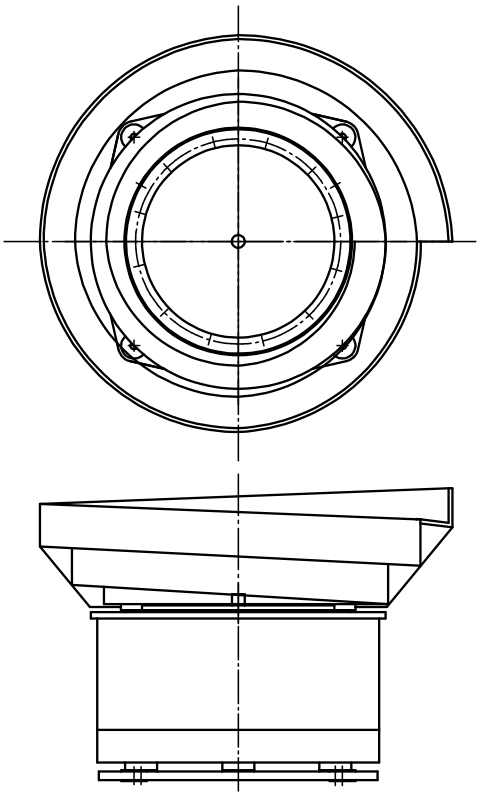

AYLESBURY AUTOMATION

VIBRATORY PARTS FEEDER EURO SERIES

INTRODUCTION

Please read this manual carefully before using your Vibratory Parts Feeder. This manual contains information that will assist you with all aspects of safe unpacking, installation and maintenance, to ensure machine longevity.

WARNING

'Umax' dial on all control boxes has been factory set to maximum coil voltage for multi-voltage coils. Any adjustment of this setting could result in damage to the coil and control box due to overheating.

This manual illustrates all options that are available in the Euro Series V.P.F. range, i.e. SI 150, 200, 250, 400, 625 and 630; not all of these will be on your machine.

Before reading this manual please check that the following have been supplied.

- Drive unit
- Bowl
- Spare springs and shims (untooled equipment only)

Aylesbury Automation makes every effort to ensure that this manual is reviewed whenever any significant changes are made to the design. However our policy of continuous product improvement may result in some small differences between the unit supplied and the description in this document.

Risk assessments for these products are available on request.

For general enquiries regarding your machine, contact the **Service Department** on:

Tel. +44 (0) 1296 314300
Fax. +44 (0) 1296 421625

For spare parts enquiries, contact the **Automation Sales Department** on:

Tel. +44 (0) 1296 314300
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Parts List – All Models

Assembly Drawing - Model 150
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Assembly Drawing - Model 400
Assembly Drawing - Model 625
Assembly Drawing - Model 630

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1.0 INSTALLATION

1.1 Services

The following services are required before the machine can be installed:

200v 50/60Hz. Single Phase or 100v 50/60Hz. Single Phase

1.2 Unpacking and Handling

NOTE: The user is recommended to retain the packaging. If any damage has occurred to the equipment, Aylesbury Automation will need to inspect all materials.

WARNING

Do not lift the V.P.F. by the top plate or the bowl, as this WILL strain the springs and alter the coil setting.

See 'Technical Description' for the weight of the parts feeder to enable it to be lifted safely into position.

MODEL NUMBER	HANDLING	WEIGHT (UNTOOLED UNIT)
150	Lift carefully into its operating position	8.4 Kg.
200	Remove the spare springs and shims (untooled units only), then move the v.p.f. carefully into its operating position	13.2 Kg.
250 & 400	Remove the spare springs and shims (untooled units only), then move the v.p.f. into position using the eyebolt supplied with the unit located in the centre mounting hole of the bowl. Once the unit is positioned, the eyebolt should be removed and the rotating centre or bowl plug placed into position.	250 – 53.2 Kg. 400 – 120.0 Kg.
625	Remove the spare springs and shims (untooled units only), then move the feeder into position using the three eyebolts which are attached to the base casing of the unit and can be accessed by removing the cover. Once the unit is positioned the cover should be replaced. The three eyebolts may remain fitted in the base.	260.0 Kg.
630	Remove the spare springs and shims (untooled units only), then move the feeder into position using the three eyebolts which are attached to the base casing of the unit and can be accessed by removing the rotating centre. Once the unit is positioned the rotating centre should be replaced. The three eyebolts may remain fitted in the base.	240.0 Kg.

1.3 Setting-up Procedure

CAUTION: Do not connect the vibratory parts feeder directly to the mains supply.

Connect the electrical supply to the control box (see control box instructions). Plug the vibratory parts feeder into the control box. Turn the control box on. Rotate the control knob until the feed rate is satisfactory, but no further than necessary, as excessive vibration may actually decrease output and cause unnecessary wear and waste of power.

SAFETY WARNING

Do not attempt to start the machine unless you understand what you are doing and you have taken all the safety precautions normally required for industrial electronic control systems and machines. Read thoroughly any manuals included with this machine for equipment with which you are unfamiliar.

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NOTE: This machine is to be used only with the product for which it was supplied.

It is recommended that the vibratory parts feeder should be mounted on one of the specially developed stands, which provides a safe mounting base for the parts feeder. If one of these stands is used it **MUST** be securely bolted to a foundation before the parts feeder is attached.

If an alternative stand is to be used, it must be of a stable and rigid construction so that it prevents the transmission of vibration produced by the parts feeder.

The vibratory parts feeder is usually equipped with a base plate that can be secured to a suitable work surface using the holes provided. If there is no base plate supplied with the machine, the parts feeder must be secured using the threaded holes on the underside of the mounting feet.

(SI 150, 200, 250 and 400 - 3 mounting feet)
(SI 625 and 630 - 4 mounting feet)

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2.0 TUNING THE UNIT

SAFETY WARNING

At no time should hands or tools be placed within the bowl or any fitted tooling, nor attempts be made to clear blockages whilst the machine is operating. Bowl feeders vibrate at high frequency and contact with any of the moving surfaces could cause abrasions. ISOLATE POWER SUPPLY

NOTE: Vibratory Parts Feeders may require a warm up time of 30 minutes before they reach optimum feed rate.

2.1 Tuning Procedure

Although the drive units are tuned during manufacture, after tooling has been fitted it may be necessary to re-tune your system. Correct tuning of the vibratory system is essential to ensure that the optimum performance is achieved. To tune the vibratory system, follow the procedure below:

PROCEDURE	TICK WHEN CHECKED
Check that the control device has been connected correctly, see '1.3 Setting-up Procedure'.	
Remove the cover screws and then the cover. Tighten all spring stack bolts to the correct setting - see '5.0 TORQUE SETTINGS'.	
Check the air gap between the armature and the coil. If necessary adjust the gap to the correct dimension. See '3.1 Adjustment of Coil to Armature Clearance'.	

With the controller running, slowly loosen the bottom clamping screw on one of the spring stacks. This will produce a change in the speed of the components being conveyed inside the bowl.

If the feed speed decreases - install one additional spring at a time with shims in between the mating surfaces. Springs should be fitted evenly around the unit.	
If the feed speed increases - remove one spring with its shims, one at a time evenly from each stack until the correct speed is obtained.	

If the feed rate is irregular on the periphery of the bowl then either:

Remove one spring from the stack under or after the 'slow' spot in the direction of travel.	
Install one spring from the stack under or after the 'fast' spot in the direction of travel.	
Add counterbalance weights to the opposite side of the 'slow' spot.	

Note

All tooled bowls are correctly balanced before leaving our factory. It is important that all counterbalance weights are of the appropriate weight and fitted correctly.

2.2 Recommended Parts for Tuning

It may be necessary to balance an untooled bowl if additional tooling is fitted.

The following counterbalance weights are available from Aylesbury Automation:

PART No.	WEIGHT
A805170	0.17 KG
A805200	0.20 KG
A805400	0.40 KG

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3.0 COIL

3.1 Adjustment of Coil to Armature Clearance

SAFETY WARNING

The electrical power used in this equipment is at mains potential. Before carrying out maintenance or repair, isolate the electrical supply. If it is not feasible to isolate the power supply when carrying out functional testing or adjustments, any such maintenance must only be undertaken by technicians who are fully aware of the dangers involved and who have taken adequate safety precautions.

If the gap is too small the coil will strike the armature block. Conversely, if the gap is too great when the controller is turned to the maximum output, the feeder does not produce sufficient power to move the part at the desired rate. It also results in the heating of the coil and wasted energy.

To adjust the coil to the armature clearance, follow the procedure below for your machine:

MODEL	PROCEDURE	NOTE
150	1. With the power 'ON' turn the controller to the maximum setting (100%) 2. Undo the M10 full nut, located centrally at the bottom of the base, until the coil is just touching the top plate (armature) 3. Tighten the screw by $^1/_4$ turn. This will give the correct air gap setting	The unit may be laid on its side but not completely inverted.
200	1. Isolate power supply 2. Remove cover 3. Check air gap between coil and armature. Correct air gap (1.0mm) is indicated on the side of the coil. 4. Slacken 1 off M6 x 40 socket capscrew retaining armature 5. Place 1.0mm feeler gauge at each end of the armature. 6. Tighten 1 off M6 x 40 socket capscrew retaining armature 7. Refit cover 8. Switch power supply on 9. Unit is now ready for operation	
250 400 630	1. Isolate power supply 2. Remove cover 3. Check air gap between coil and armature. Correct air gap 1.0mm for all models, except 400-1 and 630-1(half wave) which is 2.0mm, is indicated on the side of the coil. 4. Slacken 2 off M6 x 35 socket capscrews retaining armature 5. Place 1.0mm, 2.0mm for 400-1 and 630-1 (half wave), feeler gauge at each end of the armature. 6. Tighten 2 off M6 x 35 socket capscrews retaining armature 7. Refit cover 8. Switch power supply on 9. Unit is now ready for operation	The coil should remain fixed with the adjustments being made to the armature only
625	1. Remove the cover. 2. Slacken 4 off M12 nuts retaining the coil (above coil plate) 3. Raise each corner of the coil ¼ turn in sequence until the coil and armature resonate. 4. Lower each corner of the coil ¼ turn in sequence, if necessary, until the resonance stops. 5. Refit cover 6. Unit is now ready for operation	

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3.2 Replacing the Voltage Plug

The coil fitted to your vibratory parts feeder is an epoxy-encapsulated multi-voltage unit and can be adapted to different voltages and/or frequencies by following the procedure below:

MODEL	PROCEDURE	NOTE
200 250 400 630	1. Isolate power supply 2. Remove cover 3. Remove 2 off M2.5 x 6 cross head screws retaining the voltage plug 4. Remove the voltage plug. It may be possible that some resistance is met when attempting to remove the voltage plug. In this event, use a suitable tool to grip the plug, but not with bare jaws or using excessive force as damage **will** occur to the plug. 5. Insert the replacement voltage plug ensuring that the screw holes in the plug are in line with the holes in the plug housing. If the plug does not push home with only light pressure, **DO NOT FORCE IT ANY FURTHER**. The plug can only be inserted in one orientation. Turn plug round and reinsert. 6. Reinsert 2 off M2.5 x 6 crosshead screws. Do not use excessive force when tightening these screws, as this will strip the thread of the voltage plug housing. 7. Refit cover 8. Switch power supply on 9. Unit is now ready for operation	 **Always isolate power supply before attempting to replace any voltage plugs**

For full range of available plugs refer to the table below:

Part Number	Voltage	Frequency
A803173	200v	100 Hz (full wave)
A803174	200v	50 Hz (half wave)
A803175	100v	100 Hz (full wave)
A803176	100v	50 Hz (half wave)

3.3 Replacing the Complete Coil

NOTE: **It is strongly recommended that an Aylesbury Automation service engineer carry out coil replacement. Should customers wish to effect this work themselves the instructions in this Section should be strictly adhered to.**

SAFETY WARNING **Before carrying out coil replacement, ISOLATE POWER SUPPLY.**

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Note: Model 150, 200, 250 (open centre bowls only), 400 and 630 coils can be removed with bowl in place. The lower socket capscrew retaining the spring banks to the base machining on Models 250, 400 and 630 may vary depending on the number of springs fitted to the unit.

MODEL	PROCEDURE
150	1. Isolate power supply 2. Remove cover 3. Disconnect plug from control box. Remove plug from cable 4. Remove cable clamp 5. Remove 3 off **lower** M6 x 20 socket capscrews retaining spring bank to base machining, but do not extract completely from spring bank, as this retains spring spacers. Remove top plate complete with spring banks and bowl (if fitted) 6. Invert unit and remove M10 full nut and washer, located on underside of base, retaining coil 7. Turn unit back to original position and extract coil, pulling electrical cable through base plate 8. To replace coil, repeat steps 3-7 in reverse order 9. Tighten 3 off M6 x 20 socket capscrews retaining top plate to required settings (see '5.0 TORQUE SETTINGS'). 10. Set coil to armature air gap (see '3.1 Adjustment of Coil to Armature Clearance'). 11. Refit cover 12. Switch power supply on 13. Unit is now ready for operation
200	1. Isolate power supply 2. Remove cover 3. Disconnect plug from control box. Remove plug from cable 4. Remove 3 off **lower** M8 x 35 socket capscrews retaining spring banks to base casting, but do not extract completely from spring bank, as this retains spring spacers. Remove top plate complete with spring banks and bowl (if fitted) 5. Invert unit and remove 3 off M6 x 20 socket capscrews and M6 washers retaining base plate. Remove base plate 6. Remove 2 off M6 x 40 socket capscrews and M6 washers retaining coil. 7. Turn unit back to original position, undo cable gland and extract coil, pulling electrical cable through base unit 8. To replace coil, repeat steps 3-7 in reverse order 9. Tighten 3 off M8 x 35 socket capscrews retaining top plate to required settings (see '5.0 TORQUE SETTINGS'). 10. Set coil to armature air gap (see '3.1 Adjustment of Coil to Armature Clearance'). 11. Refit cover 12. Switch power supply on 13. Unit is now ready for operation
250	1. Isolate power supply 2. Remove cover 3. Remove 3 off **lower** M12 x 40 socket capscrews retaining spring banks to base casting, but do not extract completely from spring bank, as this retains spring spacers. Remove top plate complete with spring banks and bowl (if fitted) 4. Remove all cable ties and remove terminal block cover and slacken off 3 terminals; live, neutral and earth. 5. Remove 2 off M6 x 35 socket capscrews retaining faulty coil and trace cable back to terminal block 6. To replace coil, repeat steps 3-6 in reverse order 7. Tighten 3 off M12 x 40 socket capscrews retaining top plate to required settings (see '5.0 TORQUE SETTINGS'). 8. Set coil to armature air gap (see '3.1 Adjustment of Coil to Armature Clearance'). 9. Refit cover 10. Switch power supply on 11. Unit is now ready for operation

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MODEL	PROCEDURE
400	1. Isolate power supply 2. Remove cover 3. Remove 3 off **lower** M12 x 60 socket capscrews retaining spring banks to base casting, but do not extract completely from spring bank, as this retains spring spacers. Remove top plate complete with spring banks and bowl (if fitted) 4. Remove all cable ties and remove terminal block cover and slacken off 3 terminals; live, neutral and earth. 5. Remove 2 off M6 x 45 socket capscrews retaining faulty coil and trace cable back to terminal block 6. To replace coil, repeat steps 3-5 in reverse order 7. Tighten 3 off M12 x 60 socket capscrews retaining top plate to required settings (see '5.0 TORQUE SETTINGS'). 8. Set coil to armature air gap (see '3.1 Adjustment of Coil to Armature Clearance'). 9. Refit cover 10. Switch power supply on 11. Unit is now ready for operation
625	1. Isolate power supply 2. Remove cover 3. Remove bowl 4. Remove 6 off upper M12 x 60 socket capscrews retaining spring banks to bowl plate. Remove bowl plate. **Note: this must be performed by 2 people** 5. Remove 4 off M12 full nuts retaining coil to studding 6. Disconnect coil cable from terminal block and lift coil clear of studding 7. To replace coil, repeat steps 3-6 in reverse order 8. Tighten 6 off M12 x 60 socket capscrews retaining bowl plate to required settings (see '5.0 TORQUE SETTINGS'). 9. Set coil to armature air gap (see '3.1 Adjustment of Coil to Armature Clearance'). 10. Refit cover 11. Switch power supply on 12. Unit is now ready for operation
630	1. Isolate power supply 2. Remove cover 3. Remove 4 off **lower** M12 x 60 socket capscrews retaining spring banks to base casting, but do not extract completely from spring bank, as this retains spring spacers. Remove top plate complete with spring banks and bowl (if fitted). **Note: this must be performed by 2 people** 4. Remove all cable ties and remove terminal block cover and slacken off 3 terminals; live, neutral and earth. 5. Remove 2 off M6 x 45 socket capscrews retaining faulty coil and trace cable back to terminal block 6. To replace coil, repeat steps 3-5 in reverse order 7. Tighten 4 off M12 x 60 socket capscrews retaining top plate to required settings (see '5.0 TORQUE SETTINGS'). 8. Set coil to armature air gap (see '3.1 Adjustment of Coil to Armature Clearance'). 9. Refit cover 10. Switch power supply on 11. Unit is now ready for operation

4.0 SPRING REPLACEMENT

The springs have standard dimensions and require no adjustment after making a replacement.

MODEL	PROCEDURE
ALL	1. Isolate power supply 2. Remove cover 3. Having identified the spring bank which houses the broken spring (see '2.1 Tuning Procedure' and '9.0 TROUBLESHOOTING') remove socket capscrews retaining the identified spring bank, making note of the position and thickness of the springs being removed 4. Replace broken spring/springs and reassemble spring bank 5. Refit spring bank and insert socket capscrews top and bottom 6. Release and re-tighten all the other spring fixings. Tighten each fixing gradually (as you would a car wheel) to reduce the strain imparted to the springs (see '5.0 TORQUE SETTINGS'). 7. Set coil to armature air gap (see '3.1 Adjustment of Coil to Armature Clearance'). 8. Switch power supply on 9. Unit is now ready for operation

5.0 TORQUE SETTINGS

The table below lists the torque settings for all socket capscrews requiring tightening when normal service procedures are carried out. **Under no circumstances must the settings listed be exceeded.**

COMPONENT	TORQUE	SI 150	SI 200	SI 250	SI 400	SI 625	SI 630
Top plate	lbf.ft	7.1	21.5	74	74	100	74
	Nm.	9.5	29	100	100	135	100
Bottom plate	lbf.ft	7.1	29	100	100	57	100
	Nm.	9.5	39	135	135	77	135
Coil	lbf.ft	N/A	12	12	12	N/A	12
	Nm.	N/A	16	16	16	N/A	16
Armature	lbf.ft	N/A	9	9	9	N/A	9
	Nm.	N/A	12	12	12	N/A	12

TO ENSURE THAT THE UNIT OPERATES AT ITS OPTIMUM EFFICIENCY, AND TO PREVENT ANY DAMAGE TO THE UNIT DUE TO EXCESSIVE TORQUE, THE ABOVE SETTINGS SHOULD BE ADHERED TO USING A TORQUE WRENCH.

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6.0 MAINTENANCE

WARNING

By virtue of design the parts feeder will produce vibratory residue from the products being fed. It is the responsibility of the operating company to ensure that all relevant safety precautions are taken to handle any hazardous material at all times during operation, cleaning and maintenance.

Daily

1. Wipe clean the bowl and the bowl tooling taking care to avoid the possibility of personal injury from any sharp edges or projections.
2. Check the performance and look for dead spots as an indication of any broken springs (see '9.0 TROUBLESHOOTING').
3. Inspect and clean any air jets, where applicable.

Weekly

1. **SAFETY CHECKS**. Check that any safety or emergency devices where fitted are fully functional.
2. Inspect the feeder tooling for any wear and replace where necessary.

3 Monthly

1. Check the torque of all spring bolts (See '5.0 TORQUE SETTINGS').
2. Check the tightness of all the rubber feet and tighten if required.

7.0 NOISE REDUCTION

Whilst every attempt has been made by using the most appropriate materials and bowl feeder coatings etc due to the nature of vibratory feeders some components may generate unacceptable noise levels. In this instance to reduce the noise emission from the components in the bowl an optional acoustic enclosure can be fitted, this reduces the noise level by approximately 10dB (A), which can be increased further by the addition of an internal lining. This noise reduction does depend, however entirely on the products being fed, the feed rate and the bowl construction.

The acoustic enclosures are manufactured in a sound absorbing material, incorporating a clear removable lid that is split to allow easy refill of the bowl.

A range of sizes is available to accommodate tooling.

8.0 GUIDELINES FOR ADDING ORIENTATION TOOLING (IF NOT FACTORY FITTED)

If you wish to add orientation tooling to an untooled bowl, please read the following guidelines:

- All tooling fitted to the vibratory parts feeder should be of a light but rigid construction.
- The tooling must be securely fixed to the bowl to achieve the maximum performance.
- Discharge tooling beyond the normal bowl outlet position should be kept to a minimum and **NOT** project beyond the greatest diameter of the bowl.
- Support brackets for the tracking and tracks should be fitted to the base plate or stand and **NEVER** to the vibratory system, as such additions will create malfunctions with feeding, and may damage the power unit and decrease the feed rate.
- ALWAYS maintain a gap of approximately 1.5mm between the bowl discharge and the track, contact between these when the parts feeder is running MUST be avoided.

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9.0 TROUBLESHOOTING

Below is a guide to help solve some of the problems that might occur during the life of the machine.
If after following all the instructions carefully you still have a problem, then do not hesitate to telephone our Service Department for assistance.

SAFETY WARNING Before any maintenance is carried out **ISOLATE POWER SUPPLY**

Symptom	Possible Cause/Remedy	Tick When Checked
Parts feeder not running	Check electrical supply to control box.	
	Check connections from control box to feeder.	
	Fuse in control box failed - change fuse.	
After a period of time the system is not giving the required output.	Screws on spring stacks loose - tighten to the correct value (see '5.0 TORQUE SETTINGS').	
	Fixing screws for the bowl loose – tighten	
	Coil gap or gaps incorrect – adjust (see '3.1 Adjustment of Coil to Armature Clearance').	
	Springs broken – replace (see '4.0 SPRING REPLACEMENT').	
	Bowl tooling is loose – Tighten all tooling fixtures	
	Rubber foot is loose - tighten.	
Parts feeder develops loud noise.	Metal cover is loose - tighten screws.	
	Rotating centre jammed – eliminate jamming.	
	Foreign bodies in coil gap - clean then check the gap, adjust if necessary (see '3.1 Adjustment of Coil to Armature Clearance').	
	Coil gap or gaps incorrect – adjust (see '3.1 Adjustment of Coil to Armature Clearance').	
	Bowl tooling is loose – Tighten all tooling fixtures	
Feeder characteristics change.	Check tuning and control box settings.	
	Too many components in bowl (overloading) – remove some product.	
Erratic feeding and dead spots.	Check that the bowl is fixed to the drive unit.	
	Check for broken springs. If, after changing the position of the bowl on the unit, the dead area moves to a new position in the bowl, then it would be reasonable to expect one or more broken springs (see '4.0 SPRING REPLACEMENT' and '2.1 Tuning Procedure').	
	Check for broken welds. This can be determined by relocating the bowl 120° on the unit. If the feeding problems remain at the same point in the bowl, it can be assumed to be within the bowl structure.	
	Bowl tooling is loose – Tighten all tooling fixtures	

10.0 RECOMMENDED SPARES

It is essential for the continuing safe and efficient operation of your machine that only genuine replacement parts are used. These are made to original drawings and manufacturing tolerances and are, therefore, completely interchangeable with the originals.

Orders or enquiries about machine parts should be directed to the Sales Department, quoting the machine reference number (clearly stamped on the machine identification plate), and the part number. In this way reference can be immediately made to the details and drawings of the machine.

Spares of certain items should be kept in stock by the customer to ensure immediate availability, this particularly applies to those items which are susceptible to wear or abuse, these are marked with # on the parts list page.

NOTES: Orientation tooling is not normally supplied as a spare. When required a service engineer can be contacted to manufacture and replace on site, or the bowl and drive should be returned for the work to be carried out by the manufacturer.

THE BOWL COATING IS CLASSED AS A CONSUMABLE ITEM, AND AS SUCH, GENERAL WEAR AND TEAR IS NOT COVERED UNDER THE NORMAL WARRANTY.

11.0 DECOMMISSIONING

WARNING:

By virtue of design, any dynamic parts movement system may produce component contact residue from the products being fed. It is the responsibility of the operating company to ensure that all relevant safety precautions are taken should any hazardous materials be present during cleaning and maintenance.

To decommission the vibratory parts feeder at the end of a run, follow the procedure below:

1. Run the vibratory parts feeder until it is clear of components.
2. Clean the vibratory parts feeder thoroughly.
3. Disconnect the main power supply unit.
4. Lightly oil all non-painted surfaces

		DRIVE UNIT MODEL NUMBER					
Item No.	Description	SI150	SI200	SI250	SI400	SI625	SI630
1	Bottom Casting (clock)	A251011	A290023	A290286	A290436	A290702	A290666
	Bottom Casting (c'clock)	A251012	A290022	A290287	A290437		A290667
2	Top Plate Sub-Assy. (clock)	A251001	A290021	A294021	A294121	A253006	A290680
	Top Plate Sub-Assy. (c'clock)	A251002	A290020	A294020	A294120	A253005	A290681
3	Base Mounting Plate	A251019	A290229	A290289	A290439	A290669	A290669
4	Cover	A251024	A290236	A290308	A290477	A290701	A290654
5	Centre Spindle			A290276	A290426		ℜ
6	Eye Bolt			A803106	A803017	A803107	A803107
7	Rubber Foot	A251018	A290230	A290274	A290425	A290425	A290425
8	Rubber Ring	A200712					
9	Rubber Edging Strip	Z56996					
10	Clamp Plate	A200673	A290233	A290271	A290271	#A200569	A290271
11	End Plate		A290232	A290270	A290270	A258004	A290270
12	Shim	#A20067	#A290240	#A290278	#A290278	#A200570	#A290278
13	Spring Separator					#A200876	
14	Spring Block					A257010	
15	Spring Block Clamp					A200878	
16	Spring – 1.0mm Thick	#A251005	#A290235		#ℑ		
	Spring – 1.5mm Thick		#A290234				
	Spring – 2.0mm Thick	#A251006		#A290272			#A290420
	Spring – 2.5mm Thick			#A290273			#A290651
	Spring – 9.5mm Thick					#A200879	
	Spring – 12.7mm Thick					#A258001	
17	Multi-voltage/frequency Coil		#A803099	#A803097	#A803098		#A803098
	110v Coil	#A203263					
	230v Coil	#A203262					
	100v Coil					#A257031	
	200v Coil		#A803084	#A803081	#ℵ	#A257030	#ℵ
18	Voltage plug 100v Half Wave			#A803176			#A803176
	Voltage plug 100v Full Wave			#A803175			#A803175
	Voltage plug 200v Half Wave			#A803174			#A803174
	Voltage plug 200v Full Wave			#A803173			#A803173
19	Armature					A201359	
20	Cable Clamp	A801167				A801186	
21	M5 x 10 Socket Capscrew	A801709				A801709	
22	M5 x 16 Socket Capscrew	A801690					
23	M6 x 10 Socket Capscrew		#A801899	A801899	A801899		A801899
24	M6 x 20 Socket Capscrew		A801960				
25	M6 x 35 Socket Capscrew			A801923			
26	M6 x 45 Socket Capscrew				A801901		A801901
27	M6 x 50 Socket Capscrew		A801695				
28	M8 x 25 Socket Capscrew		A801682				
29	M8 x 35 Socket Capscrew		#A801954				
30	M10 x 50 Socket Capscrew					#A801947	
31	M12 x 40 Socket Capscrew			#A801820			
32	M12 x 50 Socket Capscrew					#A801827	#A801827
33	M12 x 60 Socket Capscrew			#A801831	#A801831		
34	M12 x 80 Socket Capscrew				#A801907	#A801907	#A801907
35	M6 x 16 C'sunk Socket Screw	A801725					
36	M8 x 20 C'sunk Socket Screw			A801694			
37	M10 x 20 C'sunk Socket Screw				A801903		
38	M10 x 25 C'sunk Socket Screw					A801767	A801767
39	M12 x 40 Hex. Head Screw					A801997	
40	Self-Tapping Screw		A801766	A801766	A801766		A801766
41	M8 Nyloc Nut		A801672				
42	M10 Fullnut	A801700					
43	M12 Fullnut			A801769	A801769	A801711	A801769
44	M6 Washer		A290711	A290711	A290711		A290711
45	M12 Washer			A290710	A290710		A290710
46	M10 Spring Washer	A801718					
47	M5 x 26 Spring Pin	A801238					
48	M12 x 150 Stud					A801821	

Note: Solid centre bowls for Models 250, 400 and 630 require a centre plug part no. A290670

ℵ **Model 400/630 coils supplied as 200v 50Hz ½ wave (A803086) or full wave (A803082)**

ℑ **Springs for Model SI400: 400/1 2.0mm thick - A290420, 2.5mm thick – A290651**
400/2 2.0mm thick - A290272, 2.5mm thick – A290273

ℜ **Centre spindles for Model SI630: Solid centre bowls – A290685**
Open centre bowls – A290689